

ABSTRACT

LCDs for use in high intensity applications such as digital projectors are susceptible to performance degradation resulting from unwanted photoconductive effects that result from scattered light. Furthermore, the constraints under which these devices operate require that their TFTs be made of polysilicon. The present inventions shows how these problems can be overcome by inserting an opaque optical shielding element between the TFT active layer and the lower transparent plate of the LCD. Materials suitable for use in the shielding layer include thermally deposited silicon nitride, layers of silicon oxide and silicon nitride, and a refractory metal encapsulated in a suitable barrier layer. By making the lower transparent plate and the shielding element from refractory materials, the TFT active layer can be made of polysilicon (as opposed to amorphous silicon) since the plate and shield element will not be affected by the high temperatures, in excess of 1,000 °C, to which they will be exposed when the polysilicon is processed to form TFTs. Optionally, a glue layer may be inserted between the shield layer and the transparent plate and/or the shield elements may be encapsulated within a barrier layer prior to the deposition of the polysilicon. Another option of the present invention is to omit the conventional black matrix, allowing the shielding elements to take its place. A process for manufacturing the display is also disclosed.